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BIOLOGICAL SUGGESTIONS.

EXTERMINATION IN ANIMAL LIFE.

Part I.—BY NATURAL OR NON-HUMAN AGENCY.

BY W. L. DISTANT.

We need not marvel at extinction; if we must marvel, let it be at our own presumption in imagining for a moment that we understand the many complex contingencies on which the existence of each species depends.—CHAS. DARWIN.

There is no species of animal which is not exposed to destruction through various accidental agencies—by hunger or cold, by drought or flood, by epidemics or enemies, whether beasts of prey or parasites.—A. WEISMANN.

To me the greatest marvel is the countless, the infinite number of the organisms that have existed, each with its senses and feelings, whose bodies now help to build up the solid crust of the earth.—RICH. JEFFERIES.

“IMPERFECTION of the Geological Record” is a phrase that justly accounts for many of those lacunæ which disfigure, but do not impair, the evidential structure on which rests the conception of animal evolution. To realize how many links must be missing from the palæontological cable which moors the present fauna of this planet with the life existing in the ages of the past, we have only to study and enumerate the frequent dislocations which occur in our own time to the chain of life. Extinction and extermination are terms which zoologists are too often compelled to use. Hunters no longer seek the Bison on the American

prairies—the few survivors of that species are protected in a refuge locality; the Quagga is absent from the South African veld; the egg of the Great Auk has now an enhanced and melancholy value to oologists; the Dodo is extinct on the island of Mauritius, where in 1598 it was found abundant; Steller's Sea-Cow is no more. We now only read of "the last of the Tasmanians," and the encircling gloom is gathering around the Australian aborigines; while the Kalangs of Java, described by Keane as in some respects the most Ape-like of human beings, are practically extinct. As Prof. J. M. Tyler has well observed, the marsupials, except the Opossum, are confined to Australia, and the oviparous mammals or monotremes to New Zealand. Formerly the marsupials at least ranged all over Europe and Asia, for we have indisputable evidence in their fossil remains. But they have survived only in this isolated area, and here apparently only because their isolation preserved them from the competition with higher forms. If the Australian continent had not been thus early cut off from all the rest of the world, the only trace of both these lower groups would have been the Opossum in America and certain peculiarities in the development of the egg in higher mammals. This shows us how much weight should be assigned to the formerly popular argument of the "missing links." The wonder is not that so many links are missing, but that any of these primitive forms have come down to us.* As an incentive to investigation of the zoology of the Sandwich Islands, it has been stated "valuable collections are being made and brought home, and unless these are made now they can never be done, as the extinction of much of the present fauna is not only inevitable, but will be immediate."† Fortunately much has recently been done in investigating this fauna. The steady march of evolution can only be studied by the records of palæontology; the lacunæ in the faunistic record of the past can only be really understood by what is going on around us, and has occurred in recent times. Not the decrease of individuals, but the annihilation of species is what we too frequently record, and when we reflect that such studies and records are absolutely quite modern even in historic times, we may well imagine what

* 'The Whence and the Whither of Man,' pp. 87-8.

† 'Report Committ. Brit. Assoc. Ipswich,' 1895.



has taken place in the past. The views of the earlier naturalists on this subject have shared the fate of many species, and become practically extinct. Even Linnæus evidently believed in the permanence of types. He wrote : " Thus, whilst all things are purified, all things are renewed, and an equilibrium is maintained ; so that of all the species originally formed by the Deity, not one is destroyed."*

When we begin to analyse the causes that have operated in the destruction of so much animal life, two main factors are at once recognized—(1) natural phenomena, in which the action of man is entirely absent or scarcely perceptible ; (2) the sole agency of man, either directly or indirectly. The first must have been the most gigantic, acting long before the appearance of man upon the earth, unremembered, unrecorded, due to events in which our own lives played no part ; not necessarily more cataclystic than what occurs now, but covering an infinity of time compared to our own little era, and forming a resultant which we still imperfectly appreciate. The very walls of our museums, the outside structures that protect and shield the examples of a too often vanished fauna and flora, are frequently composed of or contain the relics of long extinct species. The Leitha limestone, largely used for building purposes in Vienna, comes from extensive nullipore banks in the Leitha Mountains, southwest of Vienna on the Hungarian frontier ; and just as in Paris many of the finest buildings are constructed of the consolidated calcareous remains of Foraminifera, so in Vienna are the incrustations of certain red seaweeds put to this purpose.† Some of the Egyptian pyramids are composed of limestone nearly solely consisting of the remains of extinct Nummulitids, and the cathedral of Gerona is built of the same material. Beneath London itself, in the clay on which it stands, are the embedded remains of a long extinct plant and animal life. Many of the fruits, for instance, are the produce of palm-like trees (*Nipa*) akin to the screw pines, and similar to those now growing in Bengal, in the Philippine Islands, and elsewhere in the East Indian Archipelago ; while others are the cones of plants (*Pro-*

* Preface to 'Museum Regis Adolphi Friderici.' Transl. by J. E. Smith, "Tracts relating to Nat. Hist.," p. 18 (1798).

† Cf. Kerner & Oliver, 'Nat. Hist. Plants,' vol. ii. p. 667.

teaceæ), similar to those which at the present day flourish in Australia.* Many shells, "though they belong to extinct animals, resemble those which are confined at the present day to warmer seas," including a fossil *Nautilus*, a genus which is represented by several species in the London clay.† Even our roads are sometimes paved with the remains of "extinct monsters." I remember some years ago, near Street, a village in Somersetshire, watching some stone-breakers at their melancholy occupation, and, as they broke up the Blue Lias with their hammers, the teeth of some old Saurians were exposed. Our coal-scuttles contain the remains of extinct plants, and the hideous pall of black smoke vomited from the industrial centres of which our pseudo-civilization is so proud proclaims the combustion of a flora no longer existant. The fossil resin from extinct *Coniferae* supplies the amber mouth-piece of the pipe we smoke; we ourselves are living species surrounded by and making use of the remains of others long extinct.

The effects of glacial epochs are perhaps now beginning to be understood as of a sometimes more exterminative and of a less distributive character than was formerly the general opinion. It was quite simple to invoke a glacial epoch as a giant spectre which first drove living nature south, and then attracted its return by the genial influences which attended glacial retreat. Retreating forms of life through glacial influences, and their subsequent return when such phenomena were alleviated, was a common argument in all distributive essays; it is now becoming an axiom in the study of evolution that these icy visitations often caused wholesale extermination. Many animals and plants stayed to die before they endeavoured to flee and live—at least, very often so. The gradually approaching conditions of a severe environment insidiously weakened plant and animal life; lethargy anticipated death, sudden changes of temperature effected wholesale slaughter, and, as in our own casual and unusually severe winters, there are swift swings of the pendulum which determine the effacement of much that would have survived had the stress been gradual. In these glacial spasms the intensified effects took place of what we can only realize in the

* Huxley, 'Physiography,' p. 229.

† *Id.*, *loc. cit.*, pp. 288-9.

present day, and in our own climate, by observing the deadly operation of one night's extra and unusual severity of frost on much plant life, or the avian destruction during an exceptionally severe winter. Even in present sunny Italy periods of nipping cold have taken place; for, as Gilbert White argued: "Surely the judicious Virgil, when writing a didactic poem for the region of Italy, could never think of describing freezing rivers, unless such severity of weather pretty frequently occurred."* Mr. Dixon has somewhat recently expressed his opinion that the conditions of the Ice Age, instead of being grand incentives to southern migration, exerted a vast exterminating influence, and that they must have caused the utter extinction of every species whose breeding range was entirely confined to the areas glaciated, or sufficiently within the influence of glaciation to render existence impossible. The effects of the Glacial Epoch on the dominant Euro-Asian fauna are shown to be exterminating rather than incentive to southern migration.† The same opinion has been expressed by Mr. Emery in studying the distribution of Ants: "Later the Glacial Epoch destroyed in Europe nearly all the rest of tropical insects, their return being made impossible by the natural barriers of sea, deserts, and mountains accumulated southward and eastward of our continent."‡ Sir Charles Lyell, in remarking on the absence of organic remains in stratified drift of the glacial period, regards the possibility of their having been originally scarce, and not simply destroyed by time, rain-water, and other agencies, for, as he writes, "we read of the water of the sea being so freshened and chilled by the melting of icebergs in some Norwegian and Icelandic fiords, that the fish are drawn away, and all the mollusca killed."§

We have many records of the baneful effect of sudden and severe cold on birds. The Rev. J. C. Atkinson, writing in 1891, relates that on a Whit-Monday some thirty years previously three inches of snow fell, and there were two nights—those

* 'Nat. Hist. Selborne,' Harting's edit., p. 151.

† 'The Migration of British Birds,' p. 287.

‡ "On the Origin of European and North American Ants," 'Nature,' vol. lii. p. 399.

§ 'The Antiquity of Man,' 4th edit. p. 296.

preceding and succeeding it—of very hard frost. “One of the consequences was the bursting, under the tender mercies of the frosty temperature, of hosts of the Grouse eggs” on Westerdale moors, and the equally exposed parts of Danby high moors.* In this case the majority of the birds were believed to have nested again, and no loss, excepting a late maturing, occurred. But in glacial approaches these visitations would have been more recurrent, and probably not followed by sufficiently genial weather. I noticed in the Transvaal, on the high veld at Pretoria, where the so-called winter is a dry season of delightfully temperate days and cold nights and mornings, that now and then a sharp frost supervenes for a few days, or rather nights, with fatal consequences to introduced plants, such as young blue-gums, acacias, &c. The only swannery in England is the one at Abbotsbury, near Weymouth, belonging to the Earl of Ilchester, where, in 1880, there were upwards of fourteen hundred birds. The severe winter of 1880–81 reduced the number of Swans to about eight hundred, an average which has since been maintained.† Hardy as Rocks are, “a long frost kills them in numbers, principally by slow starvation. They die during the night, dropping suddenly from their roosting-place on the highest boughs of the great beech-trees, with a thud distinctly heard in the silence of the woods.”‡ Darwin estimated that the winter of 1854–55 destroyed four-fifths of the birds in his own grounds.§ Mr. Boardman, who had great experience with birds in Canada, informed Dr. Leith Adams: “I remember during the cold season of 1858–9 that Crossbills and Pine-finches were very numerous, and I procured a large number in February, to see how far the eggs had advanced, and found them nearly as large as buck-shot. Two days afterwards we had a *warm shower, then a sudden change to extreme cold*, which killed every small native bird in the woods, where we found their bodies in abundance.”|| Mr. Kearton writes, that in the memorable winter of 1895 great numbers of Grouse perished from starvation on the northern

* ‘Forty Years in a Moorland Parish,’ p. 317.

† ‘Roy. Nat. Hist.’ vol. iv. p. 337.

‡ Jefferies, ‘The Gamekeeper at Home,’ new edition, 1890, p. 115.

§ ‘Origin of Species,’ 6th edit. p. 54.

|| ‘Field and Forest Rambles,’ p. 125.

hills; "and whilst nest-hunting in Westmorland ghylls and Yorkshire dales the following spring my brother and I found skeletons every day."* Neltje Blanchan describes the Hermit Thrushes (*Turdus aonalaschkæ*), whose range is in the eastern parts of North America, as being very rare since the severe cold and storm in the Gulf States a few winters ago, when vast numbers died from cold and starvation.† Rider Haggard has detailed his experiences in one of the islands of the Hebrides during the terrible winter of 1890-91. The keeper there told him that he picked up many Snipe, dead or dying, by the side of the frozen watercourses; indeed, the Snipe on that island, where they used to swarm, have only recently begun to recover in numbers from the effects of that year of desolation. During an exceedingly rigorous winter in Orkney, in 1894, as Mr. Campbell thinks, hundreds of Cormorants perished from hunger. In a roofless hut, a few yards from high-water mark, he counted fourteen dying and dead. Rats were busily devouring the dead, while the living stumbled weakly over the half-eaten bodies of their comrades. In the most unlikely places they were to be met with, coming right up to the doors, as if begging for shelter. One of them surprised him by waddling into the workshop, passing over his boots, as if unconscious of his presence, and settling underneath the bench to die.‡ These instances of the fatal consequences of sudden and severe cold on the lives of birds are only few and partial; they are but indications of what must frequently occur in the present living epoch of the earth, and their records fulfil the purpose of drawing attention to similar catastrophes that must necessarily have happened in the past. We could add indefinitely to the list did space allow, but must somewhat hastily refer to the exterminating effect of glacial processes on other animals, especially on mammals.

Scotland was visited with an exceedingly violent snowstorm on the night between the 24th and 25th January, 1794. James Hogg, the "Etterick Shepherd," has graphically described its devastations. In that division of the South of Scotland that lies between Crawford-muir and the Border seventeen shepherds

* 'With Nature and a Camera,' p. 163.

† 'Bird Neighbours,' p. 126.

‡ 'Notes on the Nat. Hist. of the Bell Rock,' p. 101.

perished, and upwards of thirty were carried home insensible. The number of Sheep that were lost was beyond calculation. Whole flocks were overwhelmed with snow, and their bodies were not recovered till the snow disappeared. The greater part of the rivers on which the storm was most deadly run into the Solway Frith, on which there is a place called the "Beds of Esk," where the tide throws out and leaves whatever is carried into it by the rivers. When the flood after the storm subsided there were found on that place, and the shore adjacent, 1840 Sheep, 9 Black Cattle, 3 Horses, 2 Men, 1 Woman, 45 Dogs, and 180 Hares, besides a number of "meaner animals."* The herd of Deer in Martindale Forest was estimated to number about three hundred head, but about fifty succumbed to the hardships of the terrible winter of 1893-94.† The following instance appertains partly and largely to the direct action of man, but, as cold was the original enemy, it is recorded here in the words of Mr. Baillie-Grohman. In a severe blizzard which swept over Colorado in the last week of January, 1893, a band of about one thousand Wapiti became imprisoned by the snow on a high and heavily timbered *mesa* in the mountains near Steamboat Springs. Ranchmen, prospectors, and hide-hunters, on hearing of the windfall, "waded in," killing many with clubs, as the local papers reported, and I believe not a single beast was allowed to escape.‡ According to Dr. Altum, a German forester, "the most terrible enemies of Mice are not other animals, but such sudden changes of weather as occur almost every year. Alternations of frost and warm weather destroy them in numberless quantities; one single sudden change can reduce thousands of Mice to the number of a few individuals." He also states that a succession of gales or cold and damp weather during the exodus of the Pine-moth (*Bombyx pini*) destroy it to incredible amounts, and during the spring of 1871 all these moths disappeared at once, probably killed by a succession of cold nights.§ Even fish suffer from a like cause. Col. Custance tells us that in Salmon rivers a very severe frost has been known to affect

* Cf. Low, 'Domesticated Animals of the Brit. Islands,' pp. 106-7.

† Rev. H. A. Macpherson, 'Red Deer,' p. 30.

‡ 'Fifteen Years' Sport and Life,' &c., p. 33.

§ Quoted by Prince Kropotkin, 'Nineteenth Century,' vol. xxviii. pp. 716-17.

the spawning-beds, and to destroy the whole of one year's crop of eggs.*

Plants are, as well known, particularly sensitive to these visitations. M. de Lanessan remarks: "None will be ignorant of the terrible havoc which an unseasonable cold produces on fruit-trees. The least hoar-frost occurring at the time when the shoots of the vine begin to expand is sufficient to destroy that year's vintage. An intense frost occurring at the same time would decree the death of the plant itself."† A winter storm at the end of December, 1886, was especially disastrous to junipers. Snow came on early in the evening when the thermometer was barely at freezing-point, and there was no wind. It hung on the trees in clogging masses, with a lowering temperature that was soon below freezing. The snow, still falling, loaded them more and more; then came the fatal wind, and all through that night was heard the breaking trees. When morning came there were eighteen inches of snow on the ground, and all the trees that could be seen, mostly Scotch-fir, seemed to be completely wrecked. Some were entirely stripped of branches, and stood up bare like scaffold-poles. This refers to only one spot in England.‡ We all remember Gilbert White's account of the January frost in 1768: "The ilexes were much injured, the cypresses were half destroyed, the arbutuses lingered on, but never recovered; and the bays, laurustines, and laurels were killed to the ground, and the very wild hollies, in hot aspects, were so much affected that they cast all their leaves."§ Of the December frost in 1784, the same writer states: "The frost killed all the furze and most of the ivy, and in many places stripped the hollies of all their leaves."|| The study of fossil flora discloses the fact that the temperature of the globe has been always on the decline; in ancient epochs it was very high.¶

Dr. John Murray, in discussing the undoubted resemblances

* "The Trout" ('Fur, Feather, and Fin Series'), p. 170.

† Quoted by Coe, 'Nature *versus* Natural Selection,' p. 67.

‡ Cf. Gertrude Jekyll, 'Wood and Garden' (ed. 1899), p. 27.

§ 'Nat. Hist. Selborne' (Harting's edit.), p. 302.

|| *Id.*, loc. cit., p. 308.

¶ Cf. M. Quinton (English transl.), Ann. Mag. Nat. Hist. ser. 6, vol. xviii. p. 64.

between the faunas and floras of high northern and high southern latitudes, as shown in the arctic and antarctic marine faunas and floras, is disposed to consider or invoke the deadly effects of a very ancient chilling influence. "In order to give a rational explanation of these remarkable facts in the distribution of marine organisms at the present time, as well as of the presence of tropical fossils in Palæozoic and even later geological strata within the polar areas, it seems necessary to assume that at one time there was a very different distribution of heat and light over the surface of the globe than what obtains at the present time. A uniform high temperature all over the surface of the globe in the early stages of the earth's history is required to explain these phenomena. In later Mesozoic times a gradual cooling at the poles appears to have set in, and slowly brought about the destruction of a large number of the shore and shallow water animals, especially those which secreted large quantities of carbonate of lime, or were provided with pelagic or free-swimming larvæ. This weeding-out of numerous species in the polar areas, from a fauna which must have much resembled the coral-reef fauna of the present time, accounts for the relatively small number of species which we now find in polar waters, and, through lessened competition, for the relatively large number of individuals belonging to some of these species. In still later times, when polar lands became covered with ice and snow, and when glaciers descended at almost all points into the ocean, shallow water organisms appear to have taken refuge in the deep sea, and a migration of polar animals towards the equator was initiated over the floor of the ocean."*

Although the shorter summer and the longer winter must have undermined the constitution and eventually have destroyed many delicate forms of life,† some, like the Myriapoda, can withstand great alterations of climate. Mr. Sinclair, in the island of Cyprus, found identical species of *Scolopendra* and *Lithobius*

* 'Compte-Rendu,' 3rd Internat. Congr. Zool. Leyden, pp. 109-10.

† Sir Robert Ball has argued that the shorter summer and the longer winter is the cause of the ice age, and not, as is so often thought, a less supply of heat from the sun. According to this authority, and worked on mathematical calculation which admits "of no dispute," of the total amount of heat received from the sun on a hemisphere of the earth in the course of a year, 68 per cent. is received during the summer, and 37 per cent. during the winter ('The Cause of an Ice Age,' p. 90).

not only in the heat of the low country, but also on the top of Mount Troodos, "quite at home among the snow," and as common as in what he imagined to be the more congenial climate.* This gives us some clue to the antiquity and survival of the Myriapoda, fossil remains of which have been found in the Old Red Sandstone of Scotland. That well-known insect belonging to the Thysanura (*Campodea staphylinus*) has been found by Dr. Sharp at midsummer, near the shores of the Mediterranean, in company with the subtropical White Ants, and within a day or two of the same time he noticed it to be abundant on the actual summit of Mount Canigou, one of the higher Pyrenees, where the conditions were almost arctic.† This creature has been supposed to be the nearest living representative of a primitive or ancestral insect. The mountain fern (*Cystopteris fragilis*), "while not objecting to Italian heat," yet flourishes at the base of the Riffelhorn in Switzerland, at the elevation of 9000 feet above the sea.‡

It is necessary to remember that the causes which produced the last glacial epoch are still operative in the present as well as having been so in the past. A long series of glacial visitations consequent on the sequence of natural phenomena is what we must endeavour to visualize. Sir Robert Ball calculates that the intervals between their recurrence may, it is true, be not unfrequently 21,000 years, but the period will often be far greater.§ The mind is appalled with the idea of what a vast destruction of living types, both animal and vegetal, must have taken place during these icy invasions. Many forms doubtless escaped, as we can see by the survivals of to-day, but others must have perished in whole series, leaving not a wrack behind. In the time to come, when the material civilization of Northern Europe will be annihilated under the thick mantle of ice incidental to a new glacial epoch, science in an organized form will watch and record its insidious approach. A zoological literature of the near past will then exist, and species, if destroyed, will be missed, and their obituaries written. The museums and libraries of

* 'Cambridge Nat. Hist.' vol. v. pp. 32-3.

† *Loc. cit.* p. 183.

‡ Hinchliff, 'Over the Sea and Far Away,' p. 261.

§ 'The Cause of an Ice Age,' p. 156.

mankind will then be found further south, but acquired knowledge will not be lost ; the present fauna may be more than decimated, but will not perish unsung. The despised monographer of to-day will have produced the classic of the future, and men will turn to such works as giving the history of the animal life of a long ago. Vast improvement will doubtless be effected in the art and durability of pictorial illustration, and the figures of animals and plants which now exist will be reproduced and preserved as precious relics of a vanished past. We have worked without this material ; who can gauge the nature of the work posterity will produce when possessed of the bricks now produced with such dire travail ? For after all knowledge cannot be forced—it is only slowly accumulated ; the flash of genius frequently illuminates a stage of the road, but the path again darkens, and we plod on. But the next glacial epoch will occur in an historical period, and will explain the action of its predecessors.

(To be continued.)

NOTES ON LAND-BIRDS OBSERVED ON THE NORTH ATLANTIC AND GULF OF ST. LAWRENCE, 1904.

BY JOHN TRUMBULL.

EARLY last autumn I asked a few friends to note down on some forms any land-birds they might happen to meet while crossing the North Atlantic. From material they sent me, and from notes collected by myself, I have brought together the following records. I have adhered to the same plan as last year in giving the distance from land when under two hundred miles in knots, and over that distance by latitude and longitude; and also by noting briefly the weather at the time the record was made. Where there has been any doubt as regards the identity of a species I have placed a query.

I am indebted to Prof. J. Macoun, of Ottawa, for his kindness in identifying some wings; and to Mr. W. Mowat, of the s.s. 'Sicilian,' for verifying some positions and distances.

SAVANNAH SPARROW (*Passerculus sandwichensis savanna*).—March 27th. Bay of Fundy. One seen flying about s.s. 'Tunisian' from 9.30 a.m. to 3.30 p.m. When first noticed we were fourteen miles east of Grand Menan. Clear weather. May 3rd. One seen on same steamer at 10.30 a.m., one hundred and twelve miles S.E. of Halifax, Nova Scotia. It was caught at 3 p.m., thirty-eight miles south of Sable Island. Fine clear weather. Sept. 15th. Gulf of St. Lawrence, off Heath Point. Two caught on same vessel at 1.30 a.m.; S.W. wind.

THRUSH (sp. ?).—April 23rd. One seen to alight on board at 7.45 p.m. when off Chubucto Head, Nova Scotia, by Mr. Grant Robinson, second officer. It rested for a few minutes, and then disappeared. Moderate N. wind; fine clear weather.

LAND-BIRDS (small).—April 24th. Two seen by Mr. Doyle, fourteen miles N.W. of Cape Sable, Nova Scotia, from 6 a.m. to 8 a.m. Fine weather.

FOX-SPARROW (*Passerella iliaca*).—April 24th. Bay of Fundy.

One caught at 10.40 a.m., ten miles west of Briar Island. Similar weather.

LAND-BIRD.—May 3rd. Off Sable Island. One seen by Captain Whitney. Fine clear weather.

LAND-BIRDS (small).—May 27th. Gulf of St. Lawrence. Three seen by Captain Vipond (s.s. 'Tunisian'). Light N.W. breeze, overcast.

RED-BREASTED NUTHATCH (*Sitta canadensis*).—May 27th. Gulf of St. Lawrence. One flying about ship at 9 a.m. Similar weather.

LAND-BIRD (size of Blackbird).—June 5th. Gulf of St. Lawrence. One seen at 4 a.m. by Mr. E. Cook, chief officer. Another (small yellow) observed at 8.15 a.m. between St. Paul Rock and Cape Ray, Newfoundland. Light S.W. breeze; clear weather.

THRUSH (sp. ?).—June 5th. One seen eight miles W.S.W. of Cape Ray, flying towards the land. Light S.W. breeze, fine clear weather.

WHITE-WINGED CROSSBILL (*Loxia leucoptera*).—July 3rd. Gulf of St. Lawrence, about forty miles N.W. of Bird Rocks. Four flying about ship at 8.30 a.m. Three of them were caught by a member of the crew at 11.30 a.m., two males and one female. Both males were brought to Liverpool alive. Moderate E.N.E. breeze, hazy weather.

SNOW-BUNTINGS (*Plectrophenax nivalis*).—July 29th. Gulf of St. Lawrence, off Fame Point. Two seen by Dr. Crymble, surgeon of s.s. 'Sardinian.' Sept. 26th. One settled on board s.s. 'Tunisian' at 2.20 p.m., one hundred and fifty miles east of Belle Isle. It seemed a very strong bird, and did not remain with us long. Fresh east breeze, fine and clear. 27th. Two seen by Mr. Grant Robinson, second officer of same vessel, at daylight, lat. $54^{\circ} 11' N.$, long. $45^{\circ} 24' W.$ Four more by Captain Vipond at 9 a.m., lat. $54^{\circ} 32' N.$, long. $44^{\circ} 18' W.$ The six still with us at 3.40 p.m., lat. $55^{\circ} 10' N.$, long. $41^{\circ} 41' W.$ One caught at 5.30 p.m. same day. Moderate S.W. to S.S.E. breeze, cloudy weather. 30th. One seen to settle on board same steamer by Mr. Prentice at 1 p.m., one hundred and twenty miles N.W. of Belmullet, the nearest land. It remained with the ship for an hour. Strong N.N.W. gale. Oct. 3rd. Two on s.s. 'Corinthian' when near Belle Isle. Mr. D. S. Campbell, who was a passenger, tells me

they remained with the steamer across the Atlantic to the Irish coast (Oct. 8th). 9th. Mr. Milligan reports that four came on board s.s. 'Sardinian' while passing through the Straits of Belle Isle. This record has been verified by a wing. Light W. and S.W. wind, fine clear weather. On the same day one settled on s.s. 'Pomeranian' at 10 a.m., seventy-four miles from the Irish coast, and remained on board till dusk. Fresh N.W. wind, clear. 11th. One flying round s.s. 'Tunisian' at 9.45 a.m. At noon, lat. $55^{\circ} 14' N.$, long. $39^{\circ} 55' W.$, we had five or six. Moderate N.W. gale. 15th. Mr. Freer reports three joining his ship at noon, lat. $53^{\circ} 23' N.$, long. $43^{\circ} 43' W.$, and remaining till dusk. 16th. Two observed on same steamer one hundred miles east of Belle Isle; both remained till sunset. Mr. R. Bamber, chief officer of s.s. 'Sicilian,' tells me that about a dozen came on board his steamer when passing through the Straits of Belle Isle. They increased in number to about fifty on 19th inst., and then gradually diminished till Bowling (23rd), when the last two disappeared. On same day Mr. J. E. Hodgson tells me he saw five on s.s. 'Ivenia,' lat. $47^{\circ} 41' N.$, long. $43^{\circ} 30' W.$ Two were unfortunately killed, but the remaining three lived till Boston. Mr. Guy Hamilton, chief officer, s.s. 'Ontarian,' reports meeting with five in lat. $52^{\circ} 59' N.$, long. $46^{\circ} 46' W.$ Moderate, fine weather, clear, wind easterly. Next day (17th), at 8 a.m., there were two on board same steamer, lat. $53^{\circ} 34' N.$, long. $40^{\circ} 20' W.$ Light E.S.E. breeze, fine clear weather. 25th. One seen by Mr. G. Smith, fourth officer of s.s. 'Tunisian,' at 1 p.m., lat. $53^{\circ} 31' N.$, long. $49^{\circ} 28' W.$; last seen at 4 p.m. Moderate N.N.W. gale. 26th. One heard calling before daylight, and three seen at 8.15 a.m., lat. $54^{\circ} 57' N.$, long. $41^{\circ} 50' W.$; another at 11 a.m. One seen to fall into water by ship's side at 4.30 p.m., lat. $55^{\circ} 28' N.$, long. $38^{\circ} 14' W.$ Mr. J. E. Stitch, chief officer of s.s. 'Pretorian,' observed one in lat. $56^{\circ} 7' N.$, long. $25^{\circ} 8' W.$; "weather hazy for last three days." Next day (27th) Mr. Stitch met several at noon, lat. $56^{\circ} 7' N.$, long. $18^{\circ} 35' W.$; haze and drizzling rain. One found resting on s.s. 'Tunisian' at dusk, caught at 7 p.m., but was given its liberty next day. 29th. Gulf of St. Lawrence, ten miles S.E. of Heath Point, Anticosti. One on board s.s. 'Sardinian' from 7 a.m. till noon. Fresh S.W. breeze, threatening to snow. 30th.

Mr. Freer reports meeting with three sixty miles east of Belle Isle. They remained with the ship till dusk.

LAND-BIRD (small).—July 29th. Gulf of St. Lawrence, off Anticosti. One seen at noon by Dr. Crymble. Haze; wind S.E.

SWALLOW (sp. ?).—July 29th. Gulf of St. Lawrence, off Heath Point, Anticosti. One seen by same observer at 3 p.m. Similar weather.

LAND-BIRDS (small).—July 30th. Gulf of St. Lawrence, twenty-five miles off Point Rich, Newfoundland. Four seen by same observer. Rain and haze; wind S.E.

LAND-BIRD (small).—July 31st. Gulf of St. Lawrence. One settled on board s.s. 'Tunisian'; it did not remain long. Wind variable, clear.

LAND-BIRD (small).—Aug. 28th. One seen on s.s. 'Tunisian' at 8 a.m. by officers on watch. Fine clear weather; wind S.W. at 10 a.m. Same day another small bird like a Flycatcher was seen flying about and resting occasionally.

LAND-BIRD (size of Lark).—Aug. 29th. One seen flying about s.s. 'Tunisian' by Mr. Smith, fourth officer, one hundred and twenty-one miles E.N.E. of Belle Isle. He did not see it settle. Haze and overcast sky; wind W.S.W.

BARN-SWALLOW (*Hirundo erythrogastra*).—Aug. 29th. One flying about s.s. 'Tunisian' at 5.25 p.m., lat. $53^{\circ} 29' N.$, long. $48^{\circ} 41' W.$ Moderate W.S.W. wind and distant haze. Next day (30th), at 7.10 p.m., in lat. $55^{\circ} 17' N.$, long. $40^{\circ} 06' W.$, one caught, which was probably the same bird. It was alive at midnight (31st), lat. $56^{\circ} 27' N.$, long. $25^{\circ} 20' W.$ 31st. One caught at 4 a.m., lat. $56^{\circ} 02' N.$, long. $34^{\circ} 50' W.$, died at 4.25 p.m. same day. Another at 6 a.m., lat. $56^{\circ} 05' N.$, long. $34^{\circ} 00' W.$

LAND-BIRD (small).—Sept. 2nd. Three observed from same steamer at 7 a.m., one hundred and twenty-one miles N. $70^{\circ} W.$ of Tory Island, Co. Donegal. Another at 1.30 p.m., thirty-five miles N. $53^{\circ} W.$ of same place. Light west breeze, clear weather.

LAND-BIRDS (small).—Sept. 2nd. Gulf of St. Lawrence. Mr. Milligan, chief officer of s.s. 'Sardinian,' observed three distinct species on board from daylight to dusk. Clear day, wind variable.

DOVE (sp. ?).—Sept. 10th. Mr. Guy Hamilton, chief officer of s.s. 'Ontarian,' reports meeting with one at 4 p.m., one hundred and twenty-three miles N. 76° W. of Bull Rock, Co. Cork. Weather fine and clear ; wind N.W.

LAND-BIRD (size of Thrush).—Sept. 10th. Dr. Crymble writes me he saw one from s.s. 'Laurentian,' one hundred and thirty-five miles N.W. of Belmullet, Co. Mayo. Clear weather ; wind E.

CURLEW (sp. ?).—Sept. 11th. Two flying round s.s. 'Tunisian' at 9 a.m., lat. $56^{\circ} 22'$ N., long. $24^{\circ} 17'$ W. They remained in the vicinity of ship for fifteen minutes. Hazy weather, with rain ; fresh N.E. breeze.

WHEATEAR (*Saxicola ænanthe*).—Sept. 11th. One settled on awning-stretcher of same steamer at 9.30 a.m. for a few seconds, lat. $56^{\circ} 23'$ N., long. $24^{\circ} 31'$ W. It seemed a very strong healthy bird, and showed no sign of fatigue.

SANDPIPER (sp. ?).—Sept. 11th. One flying some distance off same steamer at 12.18 p.m., lat. $56^{\circ} 33'$ N., long. $26^{\circ} 07'$ W. ; clear.

PINE WARBLER (*Dendroica vigorsii*).—Sept. 15th. Gulf of St. Lawrence, off Fame Point ; one caught at 9.30 a.m.

LAND-BIRD (large).—Sept. 18th. Mr. Milligan observed one keeping with s.s. 'Sardinian' at 7 a.m., thirty-seven miles off the Irish coast. Light W. and S.W. wind ; fine clear weather.

LAND-BIRDS (small).—Sept. 24th. Gulf of St. Lawrence, seven miles south of Heath Point, Anticosti. Mr. A. Freer, second officer of s.s. 'Pomeranian,' tells me that several small birds like Wrens were about his steamer at 5 a.m. They remained on board about six hours, and disappeared as the ship drew near Cape Whittle.

RUBY-CROWNED KINGLET (*Regulus calendula*).—Sept. 24th. One came on board with last species. Identified by wing and crest sent me by Mr. Freer. Oct. 29th. Another noted by same observer ten miles S.E. of Heath Point, Anticosti.

WOODPECKER (sp. ?).—Sept. 24th. Gulf of St. Lawrence, seven miles south of Heath Point, Anticosti. One observed at same time as first Kinglet.

HAWK (sp. ?).—Same day, twenty miles south of Little Mecatina, Gulf of St. Lawrence. One settled at 3 p.m. on crosstrees

of foremast of same steamer, and rested half an hour, and then disappeared. Fine and clear; moderate S.W. breeze.

LAND-BIRD (small brown).—Same day, forty miles S.W. of Point Rich, Newfoundland. One came on board same steamer at dusk, and probably remained till daylight. Fine, but dull; moderate S.W. breeze.

LAND-BIRDS (small).—Sept. 25th. Gulf of St. Lawrence. One seen by Mr. Grant Robinson, second officer of s.s. 'Tunisian,' at 5 a.m. Two seen by same observer between 2 p.m. and 4 p.m. Early morning foggy, wind E.; weather clearing at 4 p.m.

DUCKS (sp.?).—Sept. 29th. Two flying west at 10.30 a.m., lat. $56^{\circ} 36'$ N., long. $23^{\circ} 31'$ W.; fresh N.N.W. breeze, fine weather.

SNIFE (sp.?).—Sept. 30th. Two seen flying about ship by Captain Vipond and Mr. Robinson, one hundred and ninety-nine miles N. 75° W. of Tory Island. Strong westerly gale, fierce squalls.

GREATER REDPOLL* (*Acanthis linaria rostrata?*).—Oct. 9th. Three settled on s.s. 'Sardinian' while passing through the Straits of Belle Isle en route for Glasgow. Mr. Milligan, who sent me a wing, writes that "one of the three came across with us." N.W. wind; fine clear weather.

LAND-BIRD (small).—Oct. 14th. Straits of Belle Isle. One seen by Mr. Guy Hamilton at noon, twenty-two miles off Cape Whittle. Cloudy weather; wind N.E. 15th. Two more seen by same observer at 4 p.m., eighty-four miles east of Belle Isle. Light northerly wind; fine clear weather.

LAND-BIRDS (small).—Oct. 14th. Gulf of St. Lawrence, near Heath Point, Anticosti. Four or five seen by Captain Vipond at 7.30 a.m.; another at 10 a.m. Moderate N.N.W. breeze, clear.

THRUSH (probably American Robin).—Oct. 23rd. Gulf of St. Lawrence, off South Point, Anticosti. One seen by officers on watch ('Tunisian'). Wind S.; foggy weather.

SLATE-COLOURED JUNCO (*Junco hyemalis*).—Oct. 23rd. Gulf of St. Lawrence, off Anticosti. Mr. Grant Robinson drew my attention to one hopping about the decks at 12.35 p.m. It

* Professor Macoun has examined a wing, but is not quite satisfied with his determination.

remained with the ship till 4.30 p.m. Dense fog from noon onwards.

STARLING (*Sturnus vulgaris*).—Oct. 27th. Mr. J. E. Stitch, chief officer of s.s. 'Pretorian,' reports meeting with one at noon in lat. $56^{\circ} 7' N.$, long. $18^{\circ} 38' W.$ Haze and drizzling rain; light easterly wind.

LAND-BIRD (small).—Oct. 27th. Three seen by Mr. Grant Robinson at 12.30 p.m., lat. $56^{\circ} 15' N.$, long. $30^{\circ} 05' W.$ Fine clear weather.

LAND-BIRDS (several species).—Oct. 29th. Gulf of St. Lawrence, ten miles S.E. of Heath Point. Mr. A. Freer reports several on board his ship from 7 a.m. till noon. They suddenly disappeared when thirty-four miles from Cape Whittle, the nearest land. Three wings received were identified by Prof. J. Macoun, of Ottawa, as Redpoll (*Acanthis linaria*), Pine Siskin (*Spinus pinus*), Tree-Sparrow (*Spizella monticola*). Fresh S.W. breeze; threatening snow.

LAND-BIRD (small).—Oct. 29th. Two seen by Mr. J. Fortune from s.s. 'Tunisian' at 11 a.m., fifty-four miles N. $77^{\circ} W.$ of Tory Island. Wind variable.

LAND-BIRD (like Common Snipe).—Nov. 1st. Mr. Guy Hamilton reports meeting with one at 8 a.m., fifty-eight miles S. $89^{\circ} W.$ of Bull Rock, Co. Cork. Light N.E. breeze; fine and clear.

LAND-BIRDS (like Chaffinches).—Nov. 2nd. Same observer reports four or five at noon, lat. $52^{\circ} 31' N.$, long. $19^{\circ} 23' W.$ Moderate W.S.W. breeze and cloudy weather. 3rd. Two still on board at noon, lat. $53^{\circ} 13' N.$, long. $25^{\circ} 55' W.$ Moderate westerly breeze.

LAND-BIRDS (size of Blackbirds).—Dec. 18th. Sixty miles off Nova Scotia. Three observed keeping with s.s. 'Sicilian' for few minutes. Moderate N.N.W. wind; hazy.

These notes may be looked upon as showing, in a very small way, the number of birds which are seen yearly on the North Atlantic, and Gulf of St. Lawrence. Probably, if they were multiplied by forty or fifty times, they would be still far short of the number that wander out to sea.

It will be seen that the Snow-Bunting is the most frequent bird met with, and that it occurs in considerable numbers, and

over a wide area of the Atlantic, in September, October, and November. There is no doubt that the majority of them are young and inexperienced birds, but that a fair number are mature ones, probably carried out to sea by strong gales. It seems strange that the Wheatear should be met with in much the same part of the Atlantic for the last three years, unless it is able to fly direct from Greenland to the north coast of Ireland, a distance of over eleven hundred miles.

The American Barn-Swallow may have wandered across and escaped notice, as one lived on board the s.s. 'Tunisian' to within five hundred and fifty miles of the Irish coast. Those who have Swallow skins in their possession should examine them for this species. Further investigation will probably show that many other species occur, and that most of our American visitors to this country have been assisted chiefly by steamers from the St. Lawrence by way of Cape Race and Belle Isle.

ON A NORFOLK HERONRY.

BY A. H. PATTERSON.

NINE miles to the south-west of Great Yarmouth, on the north side of the River Yare, lies the large but scattered village of Reedham, so named, it is supposed, from the great quantities of reeds that formerly characterized the adjacent lowlands; and made somewhat important by reason of its being constituted a "junction" by the Great Eastern Railway. It was here, too, that Lodbrog the Dane is said to have been slain by the jealous Berne, the Saxon king's huntsman.

To me the greatest interest attached to Reedham is the fact that a flourishing colony of Herons is established there, and, after a long-determined intention, I at length paid a hurried visit to it on the hot sultry afternoon of July 15th of the present year. The heronry may be easily seen from the window of the train just as it enters the outskirts of the village, although the unsuspecting might pass and repass it many times without a knowledge of its existence. At intervals along the route the lumbering flight of a passing Heron may be noticed, or some member of this colony may be seen thigh-deep in a Breydon "run," watching for a lunch of Eels; and now and again another, scarce troubling to look at the snorting engine ahead of us, stolidly eyes the ditch he stands in, hoping for the coming of some Vole or Stickleback, for he knows the monster to be harmless as far as he is concerned.

The Reedham heronry is situated about a mile from the station, on Mr. Stimpson's estate, in a wooded "carr," on rising ground where the marshes commence, and is reached by a round-about roadway, made lively for the pedestrian at this season by the onslaught of flies, which seem to be awaiting his coming in the tall nettles that forefront the thickset hedges, and where the Meadow-Brown butterflies start ahead at his shadow.

I was fortunate in finding Mr. Pearson, the steward, immediately on entering the farm premises, and was made

noisily welcome (?) by a brace of chained dogs belonging to a well-known circus proprietor. It was but a short ramble from here to the heronry ; the harsh cries of some of the birds betokening that several of them were as yet at home. Pearson, a most intelligent and interesting man, and who seems justly proud of the birds, pointed out, as we strolled along, a turnip-field most woefully suffering from the "canker"; on every leaf, or remnant of it, were numbers of small green larvæ,* with curiously pointed posterior, and which skipped about in a most excited manner on a sheet of paper when touched, in that lateral wriggling fashion assumed by a chopped worm, but infinitely more quickly. At the time of writing I am informed that my old friends the Starlings are now after them by thousands, but the pests are so widely distributed in Norfolk this year that irreparable damage will be done the farmers. On the field mentioned a hundred and forty Herons have at times assembled.

As one enters the closely packed clump of tall Scotch firs and somewhat attenuated ashes, he is greatly impressed by the luxuriant growth of the reeds and bracken that, often together, crowd beneath them, the fronds of the latter shoulder-high in places ; whilst beautiful ferns, tall vicious nettles, and sprays of red campion abound, and hundreds of red-ripe wild raspberries invite him to pluck and taste them. The height of the trees and their thickly bushed tops attract attention, as also does one ancient fir, standing in their midst dead and decaying—a barked, scarred, and punctured skeleton ; you feel something akin to pity as well as interest in the old thing, which seems ready to totter and fall, but the sturdy survivors, clustering around it, ward off the evil day, and screen it from every wind. In that dead tree more interest seemed centred than in all those living ; it had died of sheer old age, and was now a happy hunting-ground of the Lesser Spotted Woodpecker. The droppings of the Herons had not killed it, or why had it suffered alone ? The thickly growing undergrowth had caught much of the Herons' excreta before any of it had touched the earth beneath it, and, far from suffering, grew the more rankly for it. There was "an

* I forwarded several of them to Mr. H. J. Thoulless, of Norwich, with whom they pupated ; he has since informed me they were the larvæ of a small moth (*Plutella cruciferarum*). It is a very distinctive species.

ancient and fish-like smell " in the air that tickled the nostrils somewhat, but not offensively, although the bailiff assured me " there was something in it " after a heavy shower of rain.

Kestrels were here in plenty, and the keen-eyed hawks dashed into the open with emphatic and shrilly cries of " kee, kee, kee! " at our approach. " You don't kill the Kestrels? " I asked of Pearson. " No, I do not, " he replied ; " they are far too useful. ' A remark that spoke much for his forbearance and common sense.

Wood-Pigeons, too, " flip-flapped " away from their slovenly nests, leaving their low-built, loosely-stacked bundles of faggots in hot haste ; in one instance I saw the greater part of an egg showing between the foundations.

In a few moments we came under the Herons' nests, which needed no pointing out, for such huge constructions, although by no means carelessly built, and with several occasionally adorning a single tree, stood out boldly between my binoculars and the sky ; and in the few open spaces between the topmost boughs old birds might be seen wheeling around on light strong wing, in a manner by no means ungraceful, and altogether different from that heavy lumbering flight one notices as fishing birds move from one Breydon " drain " to another, or when lazily winging their way over the marsh ditches. The familiar " frank! " was repeatedly uttered, and an occasional deeper bass " trouk! " betrayed anxiety and a note of warning. Some nest had probably and unwittingly been bereft of a younger tenant ; while presently we found our surmise correct, for we came across a young Heron, full-feathered but unable to fly, who at our approach, scared and excited, played a clumsy game of leap-frog with the bracken he as often blundered through. We let him go ; his parents would have found it awkward to drop through the tangled branches to come and console him, but there can be no doubt he will find enough food thrown down to him, perhaps unintentionally, to keep him going until he dares venture out to the neighbouring ditches to hunt for himself.

Only a few young Herons remained in their nests ; the majority of these, indeed, sat or stood just outside them. We noted that they were well-feathered, and all but ready to follow their elders to their daily war upon the Frogs and Voles and fishes

But such bundles of faggots were these high-perched nests ! Some of them would well-nigh have filled a wheelbarrow. On one large ash-tree there must have been over a dozen, and the whole ninety and more of them were so closely built that you might have sat in the central one, and easily have pitched its eggs into the furthestmost nest. And this is the heronry, in the very wood wherein, three hundred years ago, Sir Thomas Browne also saw the Spoonbills nesting ! I felt like taking off my hat, for the place seemed hallowed by associations, and venerable in its history.

The Herons are looked for every year, "reg'lar as a clock," on Feb. 1st ; their call is heard for the first, the bailiff assured me, on that date at about eight in the evening ; so punctual are they on their return. On April 1st young ones are heard "twipping" in the nests. The young ones in early summer keep much in the vicinity of the wood, using that side most sheltered from the wind. The Frogs, Water-Voles, Sticklebacks, and other creatures in the neighbouring moist places then pay heavy toll. At pairing-time there is much ado in the tree-tops, and squabbles are not infrequent ; and no wonder, when they begin to set up establishments as close to each other as houses in a Yarmouth "Row." In August they all go, and find fresh pastures. Some, no doubt, take a trip to the Continent, a procedure as fashionable with birds as men.

It was made pretty plain, too, where there were nests overhead, by the big area of white-splashed plants below. A score of angry and inebriated whitewashers could not have flung their trade-marks half so effectively ; it seemed to have rained excreta ! And lying around in the thinner clad places, and under the bracken, were many pellets, mostly the size of ducks' eggs. I noticed these in hundreds when brushing aside the herbage in order to discover any fish that might have fallen, but in this search I was not fortunate ; I certainly picked up a three-inch tail-end of an Eel, brown, frayed, and evil smelling. It had evidently been thrown up by an overfed or excited youngster. Two of the pellets I took home with me, and pulled to pieces ; they smelt like decayed mushrooms. They were hard to disintegrate, being closely matted, and had much the appearance, when torn, of black cotton-wool ; I found them composed almost

entirely of the fur of the Water-Vole, with a few broken, brittle teeth and fragments of skulls, that crumbled somewhat easily between the fingers. I warrant the Herons destroy thousands of Water-Voles in the course of a season. In one pellet I found cream-white maggot-like larvæ, probably of some beetle, and many minute insects, that on white paper could, by the aid of a powerful lens, be distinguished as a microscopic beetle much resembling a Staphylinid.

Mr. Pearson remarked that the Herons did now and again drop small Eels, running up to half a pound, and sometimes a few small fresh-water fishes; he had found half a small Jack, and a Trout weighing at least a pound, but never had discovered a flat-fish, which is curious, seeing that in certain seasons when, like the present one, Eels are not plentiful, and Flounders have to satisfy them when fishing on Breydon. I saw early in July six young Herons busy on Breydon, capturing little Flounders.

For neighbours the Herons have the Kestrels and Wood-Pigeons, and this season a pair of Carrion-Crows. These the bailiff said were shy, wary, and silent; they seemed to know they bore the mark of a sable Cain; they allowed of no near approach, but glided out of their nest like black spirits, noiselessly and speedily, and kept away until the coast was clear again. Rooks numerously nested there also, and as many as five hundred young ones were shot each season, and Jackdaws too had a few nests in the neighbourhood. Reedham heronry, then, is by no means a lonely spot in birddom.

All the time we were chatting and brushing through the bracken—an hour at least—various species of moths took to wing at our approach; but not so the flies, which buzzed around our heads by hundreds: our hats were beehives by comparison! The odour prevalent must certainly be sweet to them, and no doubt they find the undergrowth a happy hunting-ground; and they either welcomed us or protested—I thought they did a great deal of both—and but for decorating the eaves of my hat with a festoon of brake-leaves, the torture—to me, at any rate—would have been unendurable; my friend seemed on better terms with them. They left us, however, when we ourselves came out of the “carr,” and in a very short time I left my most communicative friend to hurry to the train, thanking my lucky star that

my "name and fame" had preceded me, and had acted as an "open sesame" to the good man's store of Heron-lore.

On arrival home I opened Mr. Southwell's dainty volume on 'Natural History' by Thomas Browne, and could but help wishing that his remark, "The great number of riuers riuulets and plashes of water makes hernes and herneries to abound in these parts," held good in its entirety to-day. But to see such a goodly heronry as that at Reedham was an experience far from uninteresting; and I endorsed his further remark respecting "yong hensies being esteemed a festiuall dish and much desired by some palates," for I certainly prefer to Wild Duck the carcase of a juvenile Heron that has not yet grown rank by living long enough on a diet of fishes and other flavouring creatures.

NOTES AND QUERIES.

MAMMALIA.

The Flight-time of the Noctule (*Pterygistes noctula*).—In a paper dealing with the habits of the Noctule (Zool. 1901, pp. 51-59), I expressed an opinion that the period of activity in this species is limited to a vespertinal flight of from one to two hours. From this opinion my friend Mr. J. Steele-Elliott (*tom. cit.* p. 153) and others dissented at the time, and more recently Mr. C. B. Moffat, in his interesting paper entitled "The Duration of Flight among Bats" ('Irish Naturalist,' 1905, pp. 97-108), arguing from the analogy of the closely allied Leisler's Bat and from his own limited experience of the Noctule, has also shown that I was wrong. Although it is beyond question that the Noctule has a matutinal flight, Mr. Moffat's observations, as well as my own, suggest that fewer individuals are abroad at dawn than in the evening twilight. I do not know of any precise observations on the time of the Noctule's exit and return in the early morning, or of the duration of the morning flight, and give my own experience with some diffidence, as it is limited to a single occasion. The Noctule abounds in the wooded Cheshire Plain, but, as its dens are usually high up in the branches of trees, it is obviously impossible in most cases to observe the Bats, even in bright moonlight, as they return from their evening flight, or leave the hole again in the early morning, and nothing can be done unless one is so fortunate as to find a den in a trunk or leafless branch which shows clearly against the sky, and is at the same time at no great height. A den about twenty feet from the ground, in a dead limb of a beech in Oulton Park, near Tarporley, furnished a fairly good subject for observation on the moonlight night of May 20th. When I reached the place at 7.40 the Bats were squeaking in the den, and continued to do so at intervals until 8.25 (eighteen minutes after sunset), when four left the hole in rapid succession, followed a few seconds later by four more, and then by two. None was heard nor seen until 9.24 (seventy-seven minutes after sunset), when one returned and dashed round the tree and among the dead branches. During the next twelve minutes others followed, though it was impossible to tell how many, and there was intermittent squeaking

in the den until ten o'clock, but no Bat entered or left the hole after 9.36. From ten there was a slight squeaking in the den at long intervals until 2.40 (eighty-five minutes before sunrise), when the noise increased, and more than one Bat emerged—in the gloom I could not tell the exact number—and all was still until 3.20 (forty-five minutes before sunrise) when three returned. These dashed round among the branches, alighting on the trunk at the mouth of the hole once or twice, and then dashing away again before entering the den, as Noctules generally do on returning from the vespertinal flight. There was no squeaking after the Bats entered the den, and I heard none until 4.2, when I left the tree. On the evening of July 12th I went again to Oulton, but was disappointed to find that the Noctules had vacated the tree; at any rate, I neither saw nor heard any between 8.20 p.m. and 2.35 a.m. I then went down to the mere, but, although at 2.45 I could see several Daubenton's Bats skimming over the water, it was too dark to make out any Noctules which may have been hawking overhead. At 3.3, when it was fairly light, I saw one, and from then until 3.47 (thirteen minutes before sunrise), when the last disappeared, several more, though not nearly so many as one may see flying over the mere on any summer evening.—CHARLES OLDHAM (Knutsford).

Daubenton's Bat (*Myotis daubentoni*) in Denbighshire.—Little is known as yet of the distribution of Daubenton's Bat in Wales. It may therefore be of interest to record that on the evening of June 13th last I watched several examples skimming in their characteristic fashion over a quiet reach of the Elwy, just above the bridge at Llanfairtalhaiarn.—CHARLES OLDHAM (Knutsford).

Lesser Horseshoe Bat (*Noctilio hipposideros*) in Shropshire.—On July 6th, 1904, a specimen of this Bat was flying around the hall of my house; it had evidently entered through the open doors, and on my approach with a light it became dazzled, and enabled me to capture it. This is the first record of this species for Shropshire, and it is now in the Worcester Museum. It is evidently an uncommon species in this neighbourhood, as since then I have been unable to procure any additional specimens.—J. STEELE-ELLIOTT (Dowles Manor, Shropshire).

Winter Whitening of the Stoat in Britain.—In 'The Zoologist' for 1904, p. 190, I see that Capt. G. H. Barrett-Hamilton asks any naturalist to add to the evidence which he already possesses as to the preponderance of female Stoats among the instances of winter whitening. In January of this year I got two very beautiful specimens near here, each

of which had a slight splash of brown only on the forehead. One was a trifle yellowish white. "Both were females and rather old," said Messrs. Pratt, of Brighton, who set them up for me. One of these Stoats is now included in the magnificent collection housed in Norwich Castle. I am glad of having an opportunity of recording the occurrence of these white Stoats so far south, and during such a comparatively mild and snowless winter as we enjoyed. — H. MARMADUKE LANGDALE (Compton House, Compton, Petersfield, Sussex).

Mus flavicollis in Suffolk.—On July 25th our Cat (now twelve years old) brought in a very fine female specimen of this Mouse, measuring quite eight and a half inches in total length. The weather was so hot at the time that I did not send it away, though it is the first I have seen for more than a year, but gave it to the Tawny Owl (*ante*, p. 264), whose enjoyment of the dainty morsel seemed to be intense.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

AVES.

Nesting of the Dartford Warbler (*Sylvia undata*) in Sussex.—On May 24th, while in Ashdown Forest, Maresfield, Sussex, I discovered the Dartford Warbler among the gorse-bushes on Camp Hill, and judging by the movements of the bird that its nest was near, commenced a search, when my brother, who was with me, drove off the female and found the nest, containing four eggs. Visiting the nest on June 16th, I found an addled egg in it, but failed to see anything of the young birds, though they must have been close at hand, if I may judge by the conduct of both the male and female. — ROBERT MORRIS ("Fernhurst," Uckfield).

Breeding Habits of the Great and Blue Tits.—I should be much obliged to any of your readers who would give me particulars of any instances in which a second brood has been reared after the first has flown in the case of either of these species.—F. C. R. JOURDAIN (Clifton Vicarage, Ashburne, Derbyshire).

The Red-backed Shrike (*Lanius collurio*) and its Prey.—This is an abundant species around this neighbourhood, several pairs nesting not far distant from my house. One pair that have reared their young close to my garden have given me an opportunity in my brief daily observations of noting to what extent this species is destructive to the young of other birds. In the first instance, some few weeks ago I noticed the male Shrike flying over the house with a young Long-tailed Tit in its claws; this it had evidently killed from a family party in a

plantation close by. It flew into a larch-tree some fifty yards distant, and thirty feet upwards, and not until I had thrown at it three times would it let fall its prey. It had been killed, as seems usual, by the back of the skull being crushed in. The following evening it captured the young of another bird, but I was unable to find it after being dropped into the undergrowth. Immediately afterwards I prevented a young Yellowhammer being killed, which it had buffeted to the ground a short distance from where I was working. Again, a young Pied Wagtail that had evidently left its nest but a short time previously and had flown on to the lawn was swooped upon immediately my back was turned and killed. The cries of the parent birds, joined by a pair of Flycatchers and a Grey Wagtail, attracted my attention to the Shrike and its victim, and, replacing the Wagtail, the Shrike immediately returned, and succeeded in flying with its proportionately very heavy load some short distance away, and over a hedge several feet high; and, although still mobbed by the various birds, devoured the greater part of the Wagtail's head before I again disturbed it for further examination; replacing it, the Shrike evidently again returned in my absence, and removed its prey away from further observation. In a previous year I found an adult Goldcrest impaled on a hedge near by, but this is the only instance I can recall where I have known any bird so treated. An instance was reported to me this year, in Bedfordshire, of a Shrike swooping upon a young Pheasant poult close to the coops. I have never witnessed any bird being attacked except by the male Butcher-Bird.—J. STEELE-ELLIOTT (Dowles Manor, Shropshire).

Albino Starling in Suffolk.—On June 12th a perfectly white Starling was shot in the adjoining parish of Beyton, and brought to me on the following day. It was a young bird, which had been out of the nest for perhaps a week, and a genuine albino with pink eyes.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Egg-depositing by the Cuckoo (*Cuculus canorus*): an Explanation. I have to explain, in reference to my notes on this subject, that the bird which we call here the "Heather Linnet" is supposed to be the Meadow-Pipit (*Anthus pratensis*) of Macgillivray; subject, of course, to further inquiry. The local name is perfectly appropriate, as the bird is practically confined to the moors; and the question now turns upon which is the most common bird which the Cuckoo depends upon for the rearing of its young. There are many birds here in the nests of which the Cuckoo elsewhere is known to deposit its eggs. This Pipit apparently varies a good deal over the area of its distribution. It is

said by the author quoted to be anteriorly tinged with red in the lower parts; it frequents moors, &c.; but he does not mention mountains, but states the nest is usually placed on a grassy bank, &c. It is usually among or about heather here. "The eggs usually five; two broods are reared." Here there are usually four eggs, seldom five—very rarely so; only one brood. In the case of his Mountain Linnet or Twite (*Linota montium*), he says that it is abundant in the northern part of Scotland, &c., where it remains all the year. It becomes less common as we proceed southward. No mention is made of its occurrence in England. A reader of 'The Zoologist' wrote to me from the North of England to say that he had found this bird acting as foster-parent there. It must be noted that Macgillivray does not refer to its occurrence there, and it will be very interesting to have this corroborated. The mention of the nesting habits seems more akin to what I see of the Meadow-Pipit here than that given of the latter bird, as regards situation, at any rate.

Egg-depositing of the Cuckoo in 1905.—I again find that the Mountain or Hill or Heather Linnet, or "Lintie," as we call it here, but which must be known as or associated with the Meadow-Pipit (*Anthus pratensis*), is the only one which I see acting as foster-parent. I have been made acquainted with two nests, in which the eggs were seen. In the one case there were four eggs of the foster-parent and one of the Cuckoo. In the other case there were also five eggs, two of which were Cuckoo's. There were two young Pipits and one young Cuckoo, leaving two addled eggs, that of the Cuckoo being a pretty large one. They were left where Rats got hold of them. These increasing quadrupeds (Brown Rats) had a representative who found the way to the ejected young birds at the vicinity of the nest, and one night, as two of my servants were taking home my horses, they saw a Brown Rat with one of the young in its mouth. They gave chase, but the Rat succeeded in getting into a hole. The young Cuckoo got on all right, and evidently had reached the leaving of the nest stage. There are very many young ones chirping about here just now, so that there has been a prolific hatching season.—W. WILSON (Alford, Aberdeen, N.B.).

The Sounds produced by the Long-eared Owl (*Asio otus*).—As a contribution to the discussion on the sounds uttered by the Long-eared Owl, I append an extract from my note-book dated May 20th, 1903:—

"Last night about nine o'clock, when I was riding past a covert at Lower Peover, I heard the discordant creaking note of a young

Long-eared Owl—strikingly like a gate swinging on unoled hinges.* I went into the covert, and made out that the noise was coming from a tree, and also from on or near the ground; but when I got close to the spot whence the sound seemed to come it ceased, and I could find nothing. To-night I went to the place at eight o'clock, and soon found a Long-eared Owl in down with incipient ear-tufts. The primaries were showing, but the bird was quite unable to fly. It was sitting on a branch of a small dead fir, about four feet from the ground, bolt upright, with wings and downy feathers pressed close to its body, and looked in that position very attenuated. The toes were two and two, on either side of the branch. When I touched the bird it hissed like a swearing Cat, snapped its mandibles, making quite a loud noise, and attempted to bite. It then lowered its head, arched its wings so that the secondaries met above its back, and spread the primaries on either side, presenting the whole upper surface of its wings to the enemy, and so increasing its apparent bulk very considerably. At the same time it puffed out its body-feathers, and snapped and hissed. It did not wag its head as an angry Barn-Owl does, but remained rigid for some seconds. This attitude, which is no doubt a terrifying one, was assumed whenever I touched or alarmed the bird. About thirty yards from the tree on which the young bird was, I found the nest in a Scotch-fir, some thirty feet from the ground—apparently an old Sparrow-Hawk's nest had been utilized—and on it was a second young bird standing bolt upright. Beneath the tree and one near it were many pellets, and the wings attached to the plucked body of a Swallow.

"A clamorous crew of Blackbirds and Song-Thrushes, with at least one Mistle-Thrush among them, was in the meantime mobbing one of the old Owls, chasing it from fir to fir in the covert. About 8.30 the birds stopped mobbing the Owl, which then came into a fir near the nest, and called loudly 'woof, woof, oo-ack, oo-ack, oo-ack.'† The Thrushes never molested it after I first heard it call, but sang in the trees, some of them close to the nest, for some time. The old Owl, from 8.30 until 9.15, when I left, was constantly calling 'oo-ack, oo-ack,' both when perched and when on the wing, but I only heard the barking 'woof, woof' once or twice after the initial cry. Just about the time that the old one began to call, the young ones started

* This note, which I take to be the hunger-cry of the young, is a familiar sound in our local fir-woods in spring; it is Mr. Gyngell's Sound No. 2, which he writes "kyiark" (*ante*, p. 183).

† These are possibly the barking or "quacking" noises alluded to by Mr. Howard Saunders ('Manual of British Birds,' 2nd edit. p. 294).

their monotonous creaking cry, and the one near the ground became much more lively, climbing clumsily among the branches, but, so far as I could see, not using its beak to help it in so doing. The old bird frequently came into the tree just above where I was standing near the young one, calling loudly, and obviously resenting my presence. Whether the young bird had left the nest voluntarily or had fallen out, the old one was evidently looking after it, and was no doubt feeding it as well as the one in the nest. The facial disc of the young bird was black; primaries blackish brown; iris deep yellow.

"Pellets gathered at the foot of the nesting tree yielded skulls of Field-Vole, Wood-Mouse—no Shrews—Buntings, Finches, and a soft-billed bird, apparently a Robin or a Hedge-Sparrow." — CHARLES OLDHAM (Knutsford).

Sounds produced by Owls.—I am interested in this subject, and, without occupying too much space of your valuable and dear old *Maga*, I shortly desire to say I can corroborate *almost* every word written by your correspondent, Mr. C. H. Bryant, as regards each of the species mentioned (*ante*, p. 265), though, just as *different people's* appreciations of sounds *differ*, I might use other terms to express these several sounds. That, however, seems to me a "science" not reduced to *School Board level yet*, and as one still leaving some blessed opening for originality. I cannot, however, speak to the "snoring" sound of *old Barn-Owls*. The "kee-yak" I have *often* heard the old Barn-Owl give voice to, *within twelve inches of my ear*. At that time, and on these occasions, he had perched on the outside sill of my bedroom window, and invariably it denoted a *ghastly triumph*, because in his claws he held a still writhing or palpitating "small deer," usually a Field-Mouse. I cannot affirm that the "kee-yak" regularly issues from the Tawny's throat, but, unless I was greatly deceived, I several times believed that such a sound emanated from a much bigger Owl—the Eagle-Owl—only different in pitch a little—which birds I kept in confinement for a term of years; at least his bill was open when I heard the weird shriek, and there was no "boom" in it. But perhaps Mr. Gurney might enlighten me on that point; to him I was indebted for one of the two birds I had—a small male. The hen was taken from the nest in Norway in 1871. I believe the latter may still be alive at Dalnaglas, Glen Shee; if so, I would be pleased to hear of her welfare. J. A. HARVIE-BROWN (Dunipace, Larbert, Stirlingshire, N.B.).

Rock-Doves (?) Nesting in Rabbits' Holes.—*This is a common habit of the Stock-Dove*, which is not the parent form of our domestic "Doo," as I believe the Rock-Dove—which *usually nests in cairns* both on the *Zool. 4th ser. vol. IX., August, 1905.*

west and east coasts—*is*. At Craighall, not only do Jackdaws occupy holes on the cliffs, but the Stock-Dove does so also; and that from an early date in the chronological history of the species in Scotland.—J. A. HARVIE-BROWN (Dunipace, Larbert, Stirlingshire, N.B.).

I HAVE just read the note by Prof. McIntosh (*ante*, p. 268) concerning the finding of two young Pigeons of doubtful parentage in a Rabbit-burrow at Nevay Park, Forfarshire. Prof. McIntosh suggests that these were probably young Rock-Doves. If this is not a misprint for Stock-Dove (which was the conclusion I first came to on reading his note), may I suggest the latter bird as the probable solution of the mystery? The Stock-Dove is well known to nest in Rabbit-burrows in the neighbouring county of Fife.—B. B. RIVIERE (Flaxley, 82, Finchley Road, N.W.).

Do Partridges Migrate?—In response to Mr. A. Patterson's request (*ante*, p. 186) for notes *re* migrating Red-legged Partridges, the following may be of interest:—A bird of this species was seen to fly in from the sea on April 4th, 1896, and alight in an exhausted condition on the east pier, where it was captured alive. Another was seen coming in from the sea in the South Bay. When about one hundred yards from the shore it dropped exhausted in the water and washed ashore. This occurred on March 22nd, 1897. A third example of the same species was picked up dead, but quite fresh, floating in the sea near Hayburn Wyke, nine miles north of Scarborough, on March 17th, 1879. I saw all three specimens.—W. J. CLARKE (44, Huntriss Row, Scarborough).

The Great Crested Grebe (*Podiceps cristatus*) in Scotland.—I am glad to be able to say that this bird is slowly but surely extending its range in Scotland. This year I saw three pairs of these interesting birds on the Lake of Menteith (Perthshire), and found two nests, the one containing two and the other three eggs. I had not time to examine all the reed-beds, or I might have found more of them. There is also one sheet of water in Renfrewshire where I know they breed annually, and possibly there are more.—T. THORNTON MACKETH (The Hall, Caldwell, Renfrewshire).

Notes on Nest-Boxes.—Our nest-boxes have during the past season been occupied by Great Tits, Blue Tits, Nuthatches, Tree-Sparrows, Starlings, and one pair of Stock-Doves. For the first time I have not had a single box taken by House-Sparrows, which seem to have given way to the Tree-Sparrows so far as the boxes are concerned, and of the latter I have had quite a dozen nests. If any moss is used in the

building of a Sparrow's nest in a box, it is pretty certain to be that of the Tree-Sparrow, and clutches of six eggs are far more frequent with this species than with its larger relative. A pair of Spotted Flycatchers built a very pretty nest on the lid of a box, but so far as I know no eggs were laid, and we had a Pied Wagtail's nest in an old water-can in ivy on a wall, which hatched off all right. One of my correspondents in Lancashire begged for a clutch of Nuthatch to put under a Tit, and of seven eggs I sent him five were hatched out by a Blue Tit. He tells me the young birds went off all in good time, and it will be interesting to know if they breed in that locality next year. I have not seen a Redstart or a Redstart's nest this season; they have occasionally come to the boxes, and a boy working in the garden told me in all good faith that he had seen a Nightingale go into a box, which, it is almost needless to add, was a hen Redstart. One of our prettiest summer migrants, the House-Martin, is certainly on the increase here, and I always endeavour to keep alive the old superstition that if the Martins' nests are disturbed it will "bring bad luck to the house." — JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

AMPHIBIA.

The Natterjack Toad (*Bufo calamita*) in Bedfordshire.—Jenyns, in 1835 ('Manual of British Vertebrate Animals'), spoke of this Toad as met with in plenty on Gamlingay Heath, in Cambridgeshire, which was about a mile from the border of Bedfordshire, and which similar tract of country extended as far as Sandy, some five miles distant. A few years later almost the whole of this heath-tract of country was broken up and brought under a high state of cultivation, which it was thought involved the extermination of this amphibian. Prof. Alfred Newton, however, kindly informs me that it is still known and survives at Gamlingay, though restricted to a very few spots, in its old haunts. On June 16th last, late in the evening, I met with a single specimen near some water-holes of a sand-pit, in the parish of Sandy, and on the following day found this species fairly abundant in what was evidently their spawning haunts. Examination of the excrement of several taken at the time consisted partly of the wing-cases of smaller Coleoptera, including the ladybird-beetle, but in confinement worms, caterpillars and other larvæ, woodlice, earwigs, and insects generally seem to be readily taken.—J. STEELE-ELLIOTT (Dowles Manor, Shropshire).

Variety of the Common Toad.—A curious variety of the Common Toad (*Bufo vulgaris*) was found in the garden here on July 11th. It

was a young animal apparently in its second year. The general tint was a pale yellowish drab or fawn-colour, with darker markings and small brick-red spots. About the head and face were irregularly shaped patches of a decided indigo-blue. Though the colouring of the young is often much more lively and varied than in older individuals, I never before met with a specimen showing any trace of the last mentioned colour.—G. T. ROPE (Blaxhall, Suffolk).

Palmated Newt (*Molge palmata*) in Western Carnarvonshire and Bardsey Island.—The Palmated Newt has a wider distribution in Britain than the two commoner species, and is found in parts of Wales, especially in the west, where the Crested and Smooth Newts do not appear to occur. In 1887 Mr. C. Oldham and I found it at Porth Ceiriad, near Abersoch, in Western Carnarvonshire (Zool. 1888, p. 394); on June 17th, 1905, I came across it still further to the west, close to Braich-y-pwll, the most westerly point in Llleyn. The Newts were in some shallow pools, below marshy ground at the top of the cliffs, at the side of the path which leads down to St. Mary's Well. These pools, owing to the dry weather, did not cover many square yards. Two days before I found Palmated Newts on Bardsey Island, about two miles to the south-west of Braich-y-pwll. Near the ruins of St. Mary's Abbey, on the island, there is a well of cool clear water, which the inhabitants told us never fails, though in droughts many of the other sources of water supply run dry. Two or three small hollows have been made just below the well for the purpose of watering the Sheep; in the largest of these pools or hollows, only about a couple of yards in diameter, there were a number of adult Newts. No other batrachians, nor any of the reptiles, are known to occur on the island. T. A. COWARD (Bowdon, Cheshire).

The Palmated Newt near Hastings.—So little is known of the distribution of our native Newts, that it may be worth while to state that the Palmated form (*Molge palmata*) is of frequent occurrence in the Hastings district. My determination of the species has been confirmed by Mr. Ruskin Butterfield. From its general resemblance to the Smooth Newt (*M. vulgaris*), the present species is doubtless often overlooked; it may, however, be recognized by the absence of pigment from the throat, by the partially webbed hind feet, and by the presence (in the male) of a filamentous process extending beyond the tail. This process appears in the young Newts some days before the disappearance of the gills. The larvæ of *M. cristata* also have very long filaments, but these are tapering, and not abrupt, as is the case with *M. palmata*.—WILFRID OLLIS (Westwood, Holmesdale Gardens, Hastings).

THE ZOOLOGICAL SOCIETY'S GARDENS.

THE great event at the Zoological Gardens during July was the completion of the new Seal Pond, which was started at the beginning of the year, and stands on the site of some Goose-paddocks, alongside the enclosures of the Ostrich House. The pond, containing about 96,481 gallons and measuring about thirty by eighteen yards, is six feet at the deepest and two feet at the shallowest end. At the deepest end rises to a height of twenty-six feet or so an imposing edifice of natural and artificial rockwork resembling a stratified sandstone cliff. At its base are the sleeping shelters for the Seals; and some eight feet above the water projects a slab of rock, forming a diving platform. In addition to the Common Seal and the female Californian Sea-Lion which have been in the menagerie for a few years, three young males of the last-mentioned species have been purchased as occupants of the pond. The feeding of these animals every afternoon is one of the great attractions at the Gardens.

The Society has more Leopards offered to it than space can be found to accommodate. Two of these animals, however, received during the past month, are of special interest, and make valuable additions to the fine series of these animals now in the Gardens. One of them, a cub, presented by Mr. F. H. Melland, came from North-east Rhodesia; the other, a subadult female, presented by Mr. Bullin, was captured near Hong Kong. Tracing them from east to west, there are now in the Gardens Leopards from Hong Kong, Malacca, Ceylon, India, Persia, Somaliland, East and Central Africa. In the case of the Asiatic specimens it is interesting to note that the richest-coloured example comes from Hong Kong, and the palest from Persia. Of more scientific, though less popular interest than the Leopards is a Little Ant-eater, or Tamandua, which is feeding well, and seems likely to thrive.

Although overshadowed in importance by the Seal Pond, the new aviary for Plovers and small perching birds is admitted on all hands to be the prettiest aviary in the Gardens. Lying between the back of the Lions' House and the great lawn, it rises to a height of about twenty feet, and covers an area of about twenty-six by eighteen yards. In the middle there is a large irregularly shaped pond, planted with rushes at the back, with water-lilies in the middle, and filled in with gravel to form shallows for the wading birds in front. In front of the pond there is a stretch of white sand; behind it and at the sides grow lilacs, hollies, laurels, forming a shrubbery for the smaller birds to

nest in. In this aviary the birds may be observed under conditions as nearly natural as it is possible to make them. Paddling about in the shallows may be seen Ruffs, Godwits, Avocets, Ringed Plovers, and Knots; a Swallow circles gracefully over the pond, and Turtle-Doves coo from the bushes.

So far as the collection of birds is concerned, the most important additions are a magnificent cock Ostrich from Somaliland, one of Hagenbeck's birds, which has recently been on exhibition at the Crystal Palace; and a series of small birds, including Blue and Maroon Tanagers, Guiana Love-birds, and two Guiana Tree-Ducks, all from British Guiana, and presented by Mr. E. W. Harper, F.Z.S. By a curious coincidence we have also received a pair of Oriental Tree-Ducks (*Dendrocygna major*), presented by Mr. W. Jamrach. The breeding and hatching of Screamers, which has only been achieved in our Gardens, and for the first time on record last year, is becoming quite a common occurrence. The pair have just hatched off their second lot of eggs, namely, four in number, this season in the Great Aviary.

R. I. P.

NOTICES OF NEW BOOKS.

The British Tunicata ; an unfinished Monograph by the late JOSHUA ALDER and the late ALBANY HANCOCK. Edited by JOHN HOPKINSON, with a history of the work by Canon A. M. NORMAN. Ray Society.

THIS is indeed a posthumous publication, but a very welcome one nevertheless. Between 1855 and 1860 Mr. Alder, at the request of Dr. Gray, undertook to prepare a "Catalogue of British Tunicata," to form a British Museum publication. When, however, the work was written by 1863, the Museum grant for the publication of these catalogues had been withdrawn, and consequently it could not appear as originally intended. It was now arranged that Alder, with Albany Hancock, should prepare a more elaborate monograph for publication by the Ray Society, but the first named died in 1867, and Hancock only survived him till 1873, the work being still incomplete. Then Prof. Huxley was consulted, who agreed to do what he could in the matter of completing the work, but from various causes he was compelled to relinquish the task. The MSS. and drawings were placed under the care of the Committee of the Newcastle Natural History Society, where they remained until last year, when the work, having again been accepted by the Ray Society, it was, at the request of Canon Norman, forwarded for publication ; for, as that authority states, the value of the monograph consists, among other points, in supplying full descriptions with illustrations of the Tunicata of our fauna as known up to the time of the death of the authors. Much sympathetic and valuable work has been expended by the editor, Mr. Hopkinson, in preparing the manuscript for the press, and this somewhat small book is another witness to the sound work of the Ray Society in making such publications possible for the use of zoologists.

The introduction is a very instructive and interesting composition. As regards the disputed position of the Tunicata in

zoological classification, the conclusion arrived at is that the Tunicata should be placed with the Mollusca. A chronological epitome of the bibliography has been compiled with care and sufficient amplitude, and, as Albany Hancock died before the conclusion of his investigation of this class of animals, "and had not written that portion of the introduction to this work which would have embraced his latest views of their anatomy and physiology," a paper which he contributed to the Linnean Society in 1867 on the subject is reproduced.

In the body of the work itself thirty British species are described, all being placed in the genus *Ascidia*; the descriptions seem ample and to the point, of a *specific* character, and not the minute diagnosis of a *specimen* as is now so frequently the case in the description of some other creatures. There are seventeen plates, and in relation to these we read:—"All Hancock's admirable work was effected with the aid of such simple means as scalpels and needles. Section-cutting and the use of chemical reagents were in his day unknown. Our author's custom was to gradually and most carefully dissect the animal, and to continually make new drawings as each fresh membrane or organ was removed, thus mastering every detail, and then, aided by the numerous sketches before him, the finished drawing was produced. Now, among the mass of drawings relating to the Tunicata, comparatively few have been finally perfected." These have been reproduced, together with such careful selections from the rest of the drawings as seemed to possess most value.





ROOTED EAGLE AND NEST (*cf.* p. 325).